

# Measurement of Light Vector Mesons by PHENIX Experiment at RHIC

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## Abstract

The PHENIX experiment at RHIC has carried out systematic measurements of  $\phi$  and  $\omega$  mesons in  $p + p$ ,  $d + Au$ ,  $Cu + Cu$  and  $Au + Au$  collisions at  $\sqrt{s_{NN}} = 200$  GeV. Consistent results have been obtained using leptonic and hadronic decay modes as well as different analysis techniques.

In  $p + p$  collisions, the transverse momentum distributions of  $\omega$  and  $\phi$ , as well as all other mesons measured by PHENIX, are well described by the Tsallis distribution functional form. Combining the  $e^+e^-$  and hadronic ( $\omega \rightarrow \pi^0\gamma$ ,  $\pi^0\pi^+\pi^-$ ,  $\phi \rightarrow K^+K^-$ ) decay channels,  $\omega$  and  $\phi$  have been measured over a  $p_T$  range of 0 - 13.5 GeV/c and 0 - 7 GeV/c respectively. New results obtained using hadronic and dielectron channels of  $\omega$  and  $\phi$  mesons in  $d + Au$  collisions extend the  $p_T$  coverage to 0.25 - 13 GeV/c and 0 - 7 GeV/c respectively, and reveal a moderate enhancement at intermediate  $p_T$  and a hint of suppression at  $p_T > 8$  GeV/c. Both observations are consistent with previous results for  $\pi^0$ ,  $\pi^+ + \pi^-$ ,  $K_s$  and  $K^+ + K^-$ .

The nuclear modification factor of  $\omega$  in  $Cu + Cu$  and  $Au + Au$  collisions measured over a  $p_T$  range of 4 - 12 GeV/c, shows that  $\omega$  has a similar suppression pattern as that of  $\pi^0$  and  $\eta$ , strengthening the observation that mesons with different masses have similar behavior but different from the one of baryons. However,  $\phi$  in  $Cu + Cu$  and  $Au + Au$  collisions, measured from 1 - 7 GeV/c, shows a suppression, that is smaller than that of the  $\pi^0$  and  $\eta$  in the intermediate  $p_T$  range (2 - 5 GeV/c), whereas at higher  $p_T$ , within the large experimental uncertainties, the amount of suppression appears similar to that of the light mesons. Results of  $\phi$  production at  $\sqrt{s_{NN}} = 62.4$  GeV show a similar behavior but with larger uncertainties. This talk will review the most recent results obtained for light vector mesons in different collision systems and energies.